REMARKS

Claims 23-33 and 42-47 were pending and stand rejected. Claims 23, 42-43, and 45 have been amended. Claims 46-47 have been canceled. Claims 48-49 have been added. Claims 23-33, 42-45, and 48-49 are pending upon entry of this amendment.

Claim 23

As amended, claim 23 recites:

A method for quantifying asymmetry of joint angles of two limbs during a movement, comprising:

determining a first set of data that comprises angles of a joint of a first limb as the first limb performs the movement;

determining a second set of data that comprises angles of a joint of a second limb as the second limb performs a similar movement, wherein the two limbs comprise the first limb and the second limb;

determining a plurality of data pairs, wherein each data pair includes a first angle from the first set of data and a second angle from the second set of data, and wherein the first angle occurs when the first limb performs an identifiable event, and wherein the second angle occurs when the second limb performs the identifiable event;

generating a cyclogram based on the determined plurality of data pairs by treating each data pair as a point in two-dimensional space; and

determining a value of a characteristic of the generated cyclogram, wherein the value quantifies asymmetry of joint angles of the first limb and the second limb.

Claim 23 is directed to a method for quantifying asymmetry of joint angles of two limbs during a movement. As described in the pending application, a first set of data is determined that comprises angles of a joint of a first limb as the first limb performs the movement (¶28). A second set of data is determined that comprises angles of a joint of a second limb as the second limb performs a similar movement, wherein the two limbs comprise the first limb and the second limb (¶28).

The first set of data and the second set of data are synchronized (¶35). Specifically, the first set of data and the second set of data are realigned so that an angle from the first set of data

that occurs when the first limb performs an identifiable event is paired with an angle from the second set of data that occurs when the second limb performs the same identifiable event (¶36). For example, an angle from the first set of data that occurs when the first limb performs a heel touchdown gait event is paired with an angle from the second set of data that occurs when the second limb performs a heel touchdown gait event.

A cyclogram is generated based on the synchronized (realigned) data (¶36). A value of a characteristic of the generated cyclogram is determined, wherein the value quantifies asymmetry of joint angles of the first limb and the second limb (¶¶37-38).

Because the legs move approximately out-of-phase during normal gait, the angle of a joint in one leg at a point in time cannot be directly compared to the angle of the corresponding joint in the other leg at the same point in time (¶35). In order to help compare these angles, the experimental angle data is synchronized (realigned) (¶35). Synchronization (realignment) is based on an identifiable event, such as a heel touchdown gait event (¶35). For example, the angle data for the first leg is realigned (re-paired) with the angle data for the second leg so that the angle of the left knee when the left heel touches down corresponds to the angle of the right knee when the right heel touches down (¶35).

Note that one set of experimental data, such as that shown in FIG. 3a, can be used to generate bilateral cyclograms whose shapes vary greatly. If the data is aligned (paired) based on corresponding instants of time, then the resulting bilateral cyclogram looks like the one shown in FIG. 3d. On the other hand, if the data is aligned (paired) based on an identifiable event, then the resulting bilateral cyclogram looks like the one shown in FIG. 3e.

103(a) rejection based on Oberg and Hershler

Claims 23-26, 28-30, 32-33, and 42-47 were rejected under 35 U.S.C. § 103(a) as being unpatentable over Oberg in view of Hershler. Applicant respectfully traverses in view of the amended claims. In addition, Applicant traverses the Examiner's statements regarding the motivation to combine Oberg and Hershler.

On June 25, 2008, the examiner and the undersigned attorney discussed claims 45 and 47 as previously pending, Oberg, and Hershler. No agreement was reached.

Claim 23 recites, in part, "determining a plurality of data pairs, wherein each data pair includes a first angle from the first set of data and a second angle from the second set of data, and **wherein the first angle occurs when the first limb performs an identifiable event, and wherein the second angle occurs when the second limb performs the identifiable event**" (emphasis added). Neither Oberg nor Hershler discloses, teaches, or suggests this claimed element.

Oberg discusses a symmetry diagram that plots left knee angle versus right knee angle (abstract). This diagram, called a "knee-knee angle diagram," provides a way to evaluate the gait symmetry between a person's left side and right side (FIG. 5; page 45, bottom of column 1). If the person's gait is symmetric, the curve of the knee-knee angle diagram will be symmetric about a line with slope 1 (page 45, bottom of column 1).

In Oberg, the knee-knee angle diagram is based on data that is aligned (paired) based on corresponding instants of time. Specifically, the first set of data (the first leg) is aligned (paired) with the second set of data (the second leg) based on corresponding instants of time. For example, at a particular point in time, the angle of the first knee is -3 and the angle of the second knee is -6 (FIG. 5). Oberg's FIG. 5 looks similar to Applicant's FIG. 3d because both are based on data that is aligned (paired) based on corresponding instants of time.

In Oberg, the data from the first leg and the data from the second leg are always aligned (paired) based on corresponding instants of time. The data are never aligned (paired) based on an identifiable event performed by the limb (e.g., a heel touchdown gait event). It follows that Oberg does not disclose, teach, or suggest "wherein the first angle occurs when the first limb performs an identifiable event, and wherein the second angle occurs when the second limb performs the identifiable event."

Therefore, Oberg does not disclose, teach, or suggest the claimed element "determining a plurality of data pairs, wherein each data pair includes a first angle from the first set of data and a second angle from the second set of data, and wherein the first angle occurs when the first limb performs an identifiable event, and wherein the second angle occurs when the second limb performs the identifiable event."

Hershler does not remedy this deficiency. All of the angle-angle diagrams in Hershler plot joint angles against each other for corresponding instants of time (introduction on page 109; single loop advantages on page 110). In other words, all of Hershler's angle-angle diagrams are based on data that is aligned (paired) based on corresponding instants of time (not based on an identifiable event performed by the limbs such as a heel touchdown gait event). It follows that Hershler does not disclose, teach, or suggest "wherein the first angle occurs when the first limb performs an identifiable event, and wherein the second angle occurs when the second limb performs the identifiable event."

Therefore, Hershler does not disclose, teach, or suggest the claimed element "determining a plurality of data pairs, wherein each data pair includes a first angle from the first set of data and a second angle from the second set of data, and wherein the first angle occurs when the first limb

performs an identifiable event, and wherein the second angle occurs when the second limb performs the identifiable event."

Therefore, claim 23 (as amended) is patentable over Oberg and Hershler, alone and in combination. Independent claims 42-43 (as amended) recite similar language and are also patentable over Oberg and Hershler, alone and in combination, for at least the foregoing reasons.

103(a) rejection based on Oberg, Hershler, and Barrey

Claims 23-26, 28-30, 32-33, and 42-47 were rejected under 35 U.S.C. § 103(a) as being unpatentable over Oberg in view of Hershler further in view of Barrey. Applicant respectfully traverses in view of the amended claims. In addition, Applicant traverses the Examiner's statements regarding the motivation to combine Oberg, Hershler, and Barrey.

As explained above, neither Oberg nor Hershler discloses, teaches, or suggests the claimed element "determining a plurality of data pairs, wherein each data pair includes a first angle from the first set of data and a second angle from the second set of data, and wherein the first angle occurs when the first limb performs an identifiable event, and wherein the second angle occurs when the second limb performs the identifiable event."

Barrey does not remedy this deficiency. Barrey discusses a method for analyzing irregularities in human locomotion (title). Accelerometers are used to obtain acceleration measurements during a controlled motion of a stabilized gait of a human being (abstract). Locomotion irregularities are analyzed relative to reference measurements (abstract). Measured accelerations are submitted to a wavelet transformation (abstract). The resulting waveform is used to detect and/or analyze the irregularities (abstract).

Barrey mentions using an "event-marking device" to synchronize the data output from an accelerometer (acceleration measurements) with the data output from other measuring devices such as cameras and force platforms based on corresponding instants of time (5:38-43; 8:42-47). The device marks "change times" (e.g., start and arrival in a walking or running test) on acceleration recordings in order to obtain synchronized video film recordings (5:65-6:3; 8:42-47; 8:66-9:5). For example, FIGS. 6 and 7 show acceleration curves synchronized with still images of a subject who is walking (6:44-49), and FIG. 18 shows acceleration curves synchronized with still images of a subject who is running (7:23-25; 12:35-37).

The Examiner cited Barrey at 9:32-42 to show synchronization of the first set of data and the second set of data (Detailed Action, p 9). Applicant disagrees. This portion of Barrey discusses FIG. 6, which shows a vertical acceleration curve (top) and a lateral acceleration curve (bottom) that are lined up with each other according to corresponding instants of time (see the x-axis). The synchronization mentioned by Barrey is the synchronization of the acceleration measurements (the two curves) with still images of a subject who is walking (the five cartoon figures).

Barrey does not disclose synchronizing, realigning, or re-pairing the first set of data (from a first limb) and the second set of data (from a second limb) based on an identifiable event performed by the limbs such as a heel touchdown gait event. It follows that Barrey does not disclose, teach, or suggest "wherein the first angle occurs when the first limb performs an identifiable event, and wherein the second angle occurs when the second limb performs the identifiable event."

Therefore, Barrey does not disclose, teach, or suggest the claimed element "determining a plurality of data pairs, wherein each data pair includes a first angle from the first set of data and a

second angle from the second set of data, and wherein the first angle occurs when the first limb performs an identifiable event, and wherein the second angle occurs when the second limb performs the identifiable event."

Additional rejections

Claim 27 was rejected under 35 U.S.C. § 103(a) as being unpatentable over Oberg in view of Hershler further in view of Kolich and as being unpatentable over Oberg in view of Hershler further in view of Barrey and Kolich. Claim 31 was rejected under 35 U.S.C. § 103(a) as being unpatentable over Oberg in view of Hershler further in view of Goswami and as being unpatentable over Oberg in view of Hershler further in view of Barrey and Goswami. Applicant respectfully traverses. In addition, Applicant traverses the Examiner's statements regarding Kolich and Goswami and regarding the motivation to combine Oberg, Hershler, and Kolich; Oberg, Hershler, Barrey, and Kolich; Oberg, Hershler, and Goswami; and Oberg, Hershler, Barrey, and Goswami. Neither Kolich nor Goswami discloses, teaches, or suggests the claimed element "determining a plurality of data pairs, wherein each data pair includes a first angle from the first set of data and a second angle from the second set of data, and wherein the first angle occurs when the first limb performs an identifiable event, and wherein the second angle occurs when the second limb performs the identifiable event."

The claims not specifically mentioned above depend from their respective base claims, which were shown to be patentable over Oberg and Hershler and Oberg, Hershler, and Barrey, alone and in combination. In addition, these claims recite other features not included in their

respective base claims. Thus, these claims are patentable for at least the reasons discussed above, as well as for the elements that they individually recite.

Applicant respectfully submits that the pending claims are now allowable over the cited art of record and requests that the Examiner allow this case. The Examiner is invited to contact the undersigned in order to advance the prosecution of this application.

Respectfully submitted,
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Dated: July 7, 2008

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